Competency 1.4 **Industrial hygiene personnel shall demonstrate a working level knowledge of how priorities are set by recording, organizing, and analyzing data.**

1. Supporting Knowledge and Skills

a. Discuss how "high risk" activities are prioritized.

b. Discuss the interpretation of statistical and non-statistical data in the evaluation of health and safety hazards.

c. Discuss how the cost of "control measures" effect the prioritization of hazards.

d. Describe the factors involved in the decision making process as they relate to the prioritization of hazards.

e. Discuss how available resources (personnel, money, equipment, etc.) affect the prioritization of hazards.

2. Recommended Reading

Review

- Patty's *Industrial Hygiene and Toxicology*, 2nd Edition, Volume IIIA, Chapter 12, "Philosophy and Management of Engineering Controls," and Volume IIIB, Chapter 7, "Interpreting Exposure Levels to Chemical Agents," Clayton & Clayton.

3. Summary

There are a wide range of results that are undesirable to management and could be termed "high risk," i.e., have the potential for death or serious injury. These risks could result in high compensation costs or in extremely adverse public relations or political consequences. The determination of what is high risk generally involves relating a plausibly adverse effect with the likelihood that the adverse effect will occur, the product of which is its risk. The more undesirable the effect and the more likely the outcome, the higher the activity risk.

Once the high-risk activities are classified as such, the question becomes in what order to address them. In an organization with unlimited resources (money, personnel, time, confidence of the public and their senior managers), all could be tackled at once or as one chose. Realistically, however, resources are limited and it is upper management, with advice from technical experts, that must determine priorities. Their decisions take into account, in addition to risk, a wide range of considerations such as current and projected budget, future plans for site and operations, current operational capabilities, politics, and liability. The more limited the resources and the higher the risk, the more difficult the decision making becomes.

In attempting to prioritize the control of risk, one of the considerations must be costs. An industrial complex may include many relatively high-risk activities, of short or continuing duration, exposing many people or a few. Available controls may be complete or partial, temporary or permanent, expensive in the short term and inexpensive in the long term, or vice versa. Achieving sufficient and cost-effective industrial hygiene controls across a site may require knowledge of all of these factors. The industrial hygienist helps to evaluate the costs and benefits of various options to control risks and presents this information in a format that is useful to its decision makers.

One can achieve statistical confidence in data in two ways, either in the individual measurement itself with respect to a criterion level (i.e., upper or lower confidence limits), or in combination with other data as representing and predicting the entire distribution of all possible future data (i.e., confidence that a percentage of future samples will be above or below a criterion level).

In general, many measurements are required to achieve statistical confidence in predicting the distribution of all future measurements, and industrial hygienists usually do not have sufficient resources to obtain that much data. As a consequence, industrial hygienists predict future results on the basis of limited measurement, observations of worst-case situations, technical journals, professional judgment, etc., rather than using strictly statistical methods.

4. Suggested Exercises

Please refer to Scenario 2 in the Scenario section of this document.